TABLE 2.—*Free-air resultant winds (m. p. s.) during February, 1929*

Altitude m. s. l.	Broken Arrow, Okla. (233 meters)				Due West, S. C. (217 meters)				Ellendale, N. Dak. (444 meters)				Groesbeck, Tex. (141 meters)				Royal Center, Ind. (225 meters)				Washington, D. C. (34 meters)			
	Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
Meters	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	N.27 W.	0.8	N.60 W.	0.5	S.72 E.	0.7	S.80 W.	1.3	N.40 W.	2.2	N.48 W.	3.2	N.27 E.	2.2	N.73 W.	0.5	S.52 W.	1.9	S.80 W.	1.9	N.37 W.	1.2	N.48 W.	1.5
250	N.35 W.	0.6	N.63 W.	0.4	S.66 E.	0.8	S.80 W.	1.4					N.41 E.	2.4	S.76 W.	0.6	S.45 W.	2.3	S.78 W.	2.2	N.41 W.	4.2	N.61 W.	3.4
500	S.38 W.	0.5	S.56 W.	0.8	S. 1 E.	2.1	S.78 W.	3.1	N.47 W.	2.0	N.52 W.	3.4	N.83 E.	1.9	S.45 W.	1.0	S.63 W.	4.2	S.68 W.	4.0	N.51 W.	6.4	N.66 W.	5.3
750	S.33 W.	0.8	S.58 W.	1.9	S.34 W.	2.9	S.76 W.	4.2	N.56 W.	2.6	N.57 W.	4.5	S.61 E.	0.7	S.54 W.	2.3	S.73 W.	5.4	S.71 W.	5.7	N.57 W.	7.8	N.66 W.	6.8
1,000	S.28 W.	1.6	S.67 W.	2.8	S.54 W.	3.8	S.83 W.	5.6	N.62 W.	3.6	N.56 W.	5.3	S.21 W.	1.8	S.63 W.	3.5	S.77 W.	7.8	S.80 W.	7.0	N.54 W.	8.9	N.69 W.	8.1
1,250	S.47 W.	2.6	S.85 W.	3.8	S.65 W.	6.0	S.84 W.	7.3	N.62 W.	4.6	N.57 W.	6.3	S.47 W.	2.7	S.73 W.	4.5	S.77 W.	8.9	S.85 W.	8.0				
1,500	S.65 W.	4.2	S.89 W.	4.7	S.73 W.	7.9	S.87 W.	9.4	N.65 W.	4.6	N.60 W.	7.2	S.81 W.	3.2	S.78 W.	5.8	S.83 W.	10.5	W.	9.3	N.60 W.	8.9	N.68 W.	11.6
2,000	S.74 W.	6.1	N.86 W.	6.6	S.79 W.	9.0	S.87 W.	12.4	N.62 W.	7.1	N.62 W.	9.4	S.77 W.	5.5	S.86 W.	7.4	S.80 W.	12.3	N.86 W.	11.4	N.69 W.	10.9	N.70 W.	11.9
2,500	S.83 W.	9.3	N.85 W.	7.8	S.77 W.	10.8	W.	14.4	N.64 W.	10.4	N.63 W.	11.4	S.88 W.	7.1	S.87 W.	8.8	S.84 W.	13.7	N.85 W.	13.0	N.85 W.	11.8	N.74 W.	15.7
3,000	S.85 W.	9.5	N.83 W.	9.7	W.	18.3	S.87 W.	16.2	N.70 W.	12.8	N.65 W.	12.7	N.89 W.	12.0	S.86 W.	10.8	S.89 W.	15.5	N.88 W.	13.9	N.80 W.	13.0	N.76 W.	15.0
3,500	S.76 W.	11.7	N.73 W.	10.9					N.76 W.	13.7	N.68 W.	13.0	N.78 W.	15.3	W.	11.8	S.86 W.	16.4	N.88 W.	15.8	N.87 W.	16.2	N.76 W.	16.9
4,000	N.87 W.	12.0	N.74 W.	11.0					N.53 W.	12.4	N.67 W.	13.8	N.80 W.	15.6	N.88 W.	11.9	S.68 W.	19.0	S.86 W.	15.3	N.85 W.	19.0	N.78 W.	18.2
4,500									N.68 W.	16.9	N.68 W.	15.4	N.68 W.	15.0	N.84 W.	12.7	S.68 W.	21.0	S.76 W.	19.4	N.78 W.	21.6	N.76 W.	18.0
5,000									N.68 W.	18.0	N.85 W.	17.0	W.	17.0	N.70 W.	10.5					W.	20.0	N.89 W.	16.2

WEATHER IN THE UNITED STATES

THE WEATHER ELEMENTS

By P. C. DAY

GENERAL CONDITIONS

Like the first month of the year, February, 1929, continued colder than normal over most parts of the country and decidely so in the northern districts from the Great Lakes westward, particularly in the far Northwest, where in some localities the month, as a whole, was the coldest of record for February, and over many other sections it stands as the second coldest February in more than 50 years.

It was also a notable month for the depth of the accumulated snow and the length of time it remained on ground over portions of the upper Mississippi Valley and near-by areas. The month was also among the wettest of record for February in a few of the Southeastern States and the driest in the far Northwest.

PRESSURE AND WINDS

The atmospheric pressure showed no unusual conditions, save the anticyclone persisted rather steadily over the Plateau area during the early part of the month and cyclones were rather frequent during the latter part over the eastern and southeastern sections.

Cold weather prevailed at the beginning over most central districts and was advancing eastward with sharp changes to colder in the Gulf States and lower Ohio Valley and a change to warmer was overspreading the northern Rocky Mountains and Plains States. Within a few days the weather became somewhat settled and steady cold existed in most northern districts.

By the morning of the 6th a cyclone had moved from the central Rocky Mountains to the middle Gulf coast and general rains had overspread the Gulf and South Atlantic States, and local snows, mostly light, had occurred over a wide area from the middle Rocky Mountains northeastward to the upper Lakes. By the morning of the 7th the eastern precipitation area had moved to the southern New England coast and important rains had occurred over the near-by areas while light snow continued in the western areas, the precipitation extending during the following day into the central and southern parts, the snow becoming very general in the Lake region and changing to sleet in portions of the southern Plains. This precipitation area extended during the 9th and 10th into most eastern districts and was followed by mostly clear to fair weather for several days.

During the 15th to 17th considerable rain occurred over the Gulf and South Atlantic States and light snows occurred at the same time over a considerable area along the northern border from the Rocky Mountains to the Great Lakes, extending southward to the Great Plains and Ohio Valley during the following day or two, and finally changing to rain over most districts from Texas and the Gulf States northeastward at the beginning of the third decade, the precipitation becoming heavy on the 21st and 22d and changing to snow or sleet along the middle Atlantic coast and to the northward.

During the early part of the month local precipitation prevailed in the middle and southern portions of the more western districts, but in the far Northwest there was little or no important precipitation until after the end of the second decade, and even after that time the precipitation in this region was light and generally local.

By the morning of the 24th a cyclone had developed over the southern Rocky Mountains and precipitation had occurred during the preceding 24 hours over the North Pacific coast and southeastward to Wyoming and Colorado. On the 25th the precipitation area had extended to the lower Mississippi Valley and by the next morning the center of the storm area had moved to Wisconsin and rain had overspread much of the country from the Mississippi Valley eastward, the falls becoming heavy in portions of the lower Mississippi and Ohio Valleys. During the 27th this rain area passed off the Atlantic coast, and another had advanced to the west Gulf coast, which during the last day moved northeast to the Carolinas, attended by heavy rains along the South Atlantic coast and by local snows over the northern portions of the precipitation area. At the same time other areas of low pressure had moved to the southern Plains and southern Rocky Mountain regions and precipitation was threatening over the entire Gulf region at the end of the month.

The averages of pressure and departures from normal and the changes in pressure from the preceding month are shown on Chart VI, and on the insets to Charts II and III, respectively, and the more important facts concerning the high winds of the month appear in the table at the end of this section.

TEMPERATURE

As stated previously, February was a decidedly cold month and this condition applied to all parts save a few of the more Northeastern States and over the Florida Peninsula and portions of near-by Georgia.

The first week was cold in all parts save the extreme Northeast and over the Southwest. The week was particularly cold over the central valleys and along the northern boundary from the Dakotas westward to Washington and Oregon, where the negative departures ranged from 10° to nearly 30°.

The second week was generally the coldest of the month, particularly over the region from the Rocky Mountains westward and from the middle Plains eastward to the Atlantic coast, save in portions of the Southeastern States, where the first day of the month was the coldest. This week was moderately warm over the Northeastern States and over the Florida Peninsula. In the interior and northern sections from the upper Mississippi and Ohio Valleys westward to the Plateau region the weekly means ranged from 10° to 20° and locally to 30° below normal, and minimum temperatures from 40° to 60° below zero were reported from exposed points in the central and northern mountain regions of the west.

The third week continued cold over nearly all parts save that it continued moderately warm over the Northeastern States and the Florida Peninsula and it was warmer than normal along the Rio Grande. The week was not so cold as the previous weeks in the Missouri Valley and far Northwest, though the lowest temperatures of the month were observed at the end over the northern section from the Dakotas and Nebraska eastward to Lake Superior.

From the 19th to the end of the month the weather continued cold over the greater part of the country and the lowest temperatures of the month were reported in the Northern States from the Great Lakes eastward. This period continued warmer than normal over the Florida Peninsula and it was slightly warmer than normal generally over the Pacific Coast States.

The month, as a whole, was the coldest of record in portions of the far Northwest, and for a period covering about a month from January 19 to February 18, inclusive, 31 days, the departure for the period averaged slightly more than 17° below the normal, a record unsurpassed in any similar winter period in the history of meteorological observations in that part of the country.

PRECIPITATION

There were but 10 States in which the average precipitation differed by as much as an inch from the normal for February. In the three Pacific States the deficiencies were large, notably in Oregon, which received but little more than a fourth of the normal quantity, on the average. The interior States as far as the Rocky Mountain Divide mainly received less than normal, save that eastern Utah and the western portions of Colorado and Wyoming mainly received somewhat more than normal.

Central and southern Texas and the Florida Peninsula recorded considerably less precipitation than normal, while farther north most of the central valleys district and practically every part of the Lake region reported moderate shortages, likewise almost every other district along the Canadian border, save that Washington had a marked deficiency, as already noted.

More precipitation than normal was received in the middle Missouri Valley, the southern two-thirds of New England and the eastern part of the Middle Atlantic States, and especially from southern Louisiana northeastward to southeastern Virginia. Within this latter belt the excess was especially marked over southern Alabama, central and northern Georgia, and the Carolinas. Some stations of long record in this area found all previous February totals exceeded. The greatest amount at any single station, as far as reported, was 16.75 inches, at River Falls, Ala.

SNOWFALL

The snowfall was mainly light in quantity in the Pacific States, and in the mountainous portions of the Southern States, save that northwestern Texas reported considerable amounts for the region, chiefly during the opening decade, and northern Georgia reported fairly large amounts on the 5th. In most other portions of the country the snowfall was greater than the normal.

In the upper Mississippi Valley, where the January snowfall had been remarkably heavy and had left the ground covered to unusual depths, the February new snowfall was not especially large, as a rule, but it was dry and drifted to an unusual extent, so that traffic on the main-traveled roads was greatly hindered. Generally the north-central portion of the country remained deeply covered till near the end of the month. At Charles City, Iowa, it was noted that the depth of snow on February 26 was the greatest ever recorded there, while in much of Kansas and Oklahoma the ground was snow covered many more days than had been the case before for several years.

At the end of February the snow pack in the elevated portions of the Western States was mainly greater than normal, especially in the Rocky Mountain States and the central part of the Plateau region. In the Pacific States the accumulated snow was mainly less than normal and the prospect there for a good water supply was not favorable.

RELATIVE HUMIDITY

The percentages of relative humidity were nearly everywhere above normal practically the only exception being at points in the Pacific Coast States, where deficiencies were quite marked locally which might be expected from the general absence of important precipitation during the month and in fact for several preceding months.